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EXAMINER	
MATTHEW, AARON D	

ART UNIT	PAPER NUMBER
2114	

DATE MAILED: 03/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/057,124	FU ET AL.	
	Examiner	Art Unit	
	Aaron D Matthew	2114	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 17-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15 and 17-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/20/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claim 16 has been cancelled.

2. Claims 1-15 and 17-30 have been examined, and are discussed below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3, 4, 5, 7, 8, 12, 17, and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al, (U.S. 6,195,760 B1), and further in view of Brittain et al, (US 6,684,396).

Regarding claim 1, Chung et al discloses a method for memory failure recovery, comprising:

- Maintaining a predetermined number of duplicate and primary processes, (col. 1, lines 62-64);
- Keeping the processes in synchronization, (note col. 1, lines 62-67);

- Managing the processes so that a single process image is presented to an external environment, (see col. 1, lines 64-66; only the primary process is capable of presenting a process image to the external environment);
- Detecting a computer exception which affects one of the processes, and terminating the affected process, (note col. 2, lines 39-41; a step of terminating a process is inherently included in a step of restarting a process).

Chung fails to teach that the predetermined number of duplicate and primary processes are in a single computer.

Brittain teaches a method for maintaining a number of duplicate and primary processes to improve fault-tolerance in a computer system, (see Abstract). Though Brittain also teaches an embodiment wherein said duplicate processes run on separate computers, Brittain discloses an embodiment wherein all copies of a process reside on a single computer, (see Abstract, and col. 4, lines 61-64).

Brittain and Chung are analogous art because they are from the same field of endeavor, viz., improving fault-tolerance in a computer system by maintaining redundant copies of a software process.

At the time of applicant's invention, one of ordinary skill in the art would have considered it obvious to combine those steps disclosed in Chung for providing a

method for failure recovery in a distributed computer system, with the method of Brittain, in order to provide a method for failure recovery, with the advantages of Chung, in a single computer.

One of ordinary skill in the art would have been motivated to combine the teachings because Brittain shows a need in the art for providing fault-tolerance in single computer systems, by running redundant copies of software processes. Although Chung teaches a fault-tolerant method for use in distributed computer systems, in view of Brittain, one of ordinary skill in the art would have clearly recognized the direct applicability of such a method in a system comprising a single computer. Brittain shows that one can provide fault-tolerance in a single computer system by running redundant processes within the same CPU. One of ordinary skill in the art would have been properly motivated, in view of Brittain, to utilize the method taught in Chung as a means for providing fault-tolerance in systems without access to multiple computers for storing backup copies.

Claim 17 is rejected based upon the same rationale applied to claim 1, above. Chung, in view of Brittain, in disclosing the method of claim 1 in a computer environment, inherently discloses a computer-usable medium embodying computer program code for commanding a computer to perform said method.

Claim 22 is rejected based upon the same rationale applied to claim 1 above. The functionality disclosed in the claims is identical.

Regarding claim 3, see Brittain, col. 6, lines 1-4.

Claim 19 is rejected based upon the same rationale applied to claim 3. Chung, in view of Brittain, in disclosing the method of claim 3 in a computer environment, inherently discloses a computer-usable medium embodying computer program code for commanding a computer to perform said method.

Regarding claim 4, see Chung, col. 3, lines 6-15, wherein the maintaining element of claim 1 includes:

- Identifying a primary process, (lines 7-9);
- Monitoring a fault-tolerance value corresponding to the primary process, (lines 10-11; also, see Figure 2); and
- Setting a number of duplicate processes equal to the fault-tolerance value, (lines 14-15).

Claim 20 is rejected based upon the same rationale applied to claim 4. Chung, in view of Brittain, in disclosing the method of claim 4 in a computer environment, inherently discloses a computer-usable medium embodying computer program code for commanding a computer to perform said method.

Regarding claim 5, note, again, Chung, col. 3, lines 6-11, wherein it is disclosed that the registration message includes a predetermined fault-tolerance value. The monitoring element of, therefore, includes assigning a predetermined fault-tolerance value to a primary process.

Regarding claims 7 and 8, see Chung, col. 3, lines 22-31, and col. 4, lines 60-65. It is inherent that, if the total number of duplicate processes is to be maintained at an amount equal to the degree of replication, any additional duplicate processes beyond that amount must be deleted.

Regarding claim 12, note, Chung, col. 1, lines 64-66, wherein only the primary process is capable of responding, (or transmitting), to an external environment.

Claim 21 is rejected based upon the same rationale applied to claim 12. Chung, in view of Brittain, in disclosing the method of claim 12 in a computer environment, inherently discloses a computer-usable medium embodying computer program code for commanding a computer to perform said method.

3. Claims 2 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al, in view of Brittain et al, as applied to claims 1 and 17 above, and further in view of Tu et al, (U.S. 6,684,346 B2).

Regarding claim 2, Chung et al discloses a method for memory failure recovery, comprising:

- Maintaining a predetermined number of duplicate and primary processes, (col. 1, lines 62-64);
- Keeping the processes in synchronization, (note col. 1, lines 62-67);
- Managing the processes so that a single process image is presented to an external environment, (see col. 1, lines 64-66; only the primary process is capable of presenting a process image to the external environment);
- Detecting a computer system exception which affects one of the processes, and terminating the affected process, (note col. 2, lines 39-41; a step of terminating a process is inherently included in a step of restarting a process).

Chung, in view of Brittain, fails to teach the method of claim 1, wherein the detecting element includes detecting a memory failure.

Tu et al teaches a fault-tolerant multiprocessing system in which multiple processes are synchronized in the event a memory failure is detected, (see col. 5, lines 9-12, and 25-27).

Chung, Brittain, and Tu et al are analogous art because they are from the same field of endeavor, viz., fault-tolerant, multiprocess computer systems.

At the time of applicant's invention, it would have been obvious to include the capability of detecting memory failure conditions in the detecting step, in view of Tu et al. As is shown in Tu et al, and as would have been well known in the art, one of many conditions that could be hazardous to a system is a memory failure condition, (see, again, Tu et al, col. 5, lines 9-12). In a multiprocessor system, in particular, there is potential that a memory failure condition could affect the behavior of more than one process if the memory is shared. One of ordinary skill in the art would have been properly motivated to include detecting memory failures in the step of detecting a failure condition, in view of Tu et al, in order to prevent the corruption of one or more of the processes due to a memory failure condition.

Claim 18 is rejected based upon the same rational applied to claim 2. Chung, in view of Brittain, further in view of Tu, in disclosing the method of claim 1 in a computer environment, inherently discloses a computer-usable medium embodying computer program code for commanding a computer to perform said method.

4. Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al, and further in view of Williams, (U.S. 6,247,143 B1), and Tu et al.

Regarding claim 23, Chung et al discloses a system for memory failure recovery, comprising:

- A primary process memory space hosting a primary process, (see Figure 1, element 101, in which primary process, A1, is located on computer, H1, and inherently hosted in a primary process memory space);
- A duplicate process memory space hosting a duplicate process corresponding to the primary process, (see Figure 1, element 102, in which duplicate process, A2, is hosted in a duplicate process memory space on computer, H2);
- Means for keeping the duplicate process in synchronization with the primary process, (col. 1, lines 60-67);
- A processor for generating an exception signal in response to detection of a failure condition which affects the primary process, (see col. 8, lines 41-45 and col. 2, lines 39-41); and
- An operating system for receiving the exception signal, terminating the affected primary process, and maintaining a predetermined number of primary and duplicate processes, (note, again, col. 2, lines 39-41; a step of terminating a process is inherently included in the step of restarting a

process; also note col. 3, lines 24-31; it is inherent that there be an operating system present for performing these functions).

Chung et al fails to teach that said means for keeping the duplicate process in synchronization with the primary process is a synchronization buffer. Chung also fails to teach that said failure condition is a memory failure condition.

Williams teaches a multiprocessor computer system which provides fault tolerance for a number of duplicate processing sets, which are kept in synchronization by a synchronization buffer, (see Abstract).

Tu et al teaches a fault-tolerant multiprocessing system in which multiple processes are synchronized in the event of a memory failure, (see col. 5, lines 9-12, and 25-27).

Chung et al, Williams and Tu et al are analogous art because they are from the same field of endeavor, viz., fault-tolerant, multiprocessor computer systems.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the synchronization buffer of Williams as a means for keeping the duplicate process in synchronization with the primary process in Chung et al.

The synchronization buffer allows for controlling and maintaining equivalent operation of the duplicate processing sets, (see col. 2, lines 43-48 in Williams). Chung et al teaches that the duplicate processes must run synchronously, (col. 2, lines 7-11), and one of ordinary skill in the art would, therefore, have considered it obvious and would have been properly motivated to combine the synchronization buffer of Williams in the fault tolerant system of Chung et al, as a means of controlling and maintaining the equivalent operation of duplicate processes.

It also would have been obvious to include capability of detecting memory failure conditions among the failure conditions in the detecting step, in view of Tu et al. As is shown in Tu et al, and as would have been well known in the art, one of many conditions that could be hazardous to a system is a memory failure condition, (see, again, Tu et al, col. 5, lines 9-12). In a multiprocessor system, in particular, there is potential that a memory failure condition could affect the behavior of more than one process if the memory is shared. One of ordinary skill in the art would have been properly motivated to include detecting memory failures in the step of detecting a failure condition, in view of Tu et al, in order to prevent the corruption of one or more of the processes due to a memory failure condition.

Regarding claim 24, Chung et al fails to teach a buffer controller for permitting the processes to receive communications from an external environment while permitting only one of the processes to transmit to the external environment.

Williams teaches a buffer controller, (see Figure 3, element 50), for permitting the processes to receive communications from an external environment, (see col. 2, lines 43-48), while permitting only one of the processes to transmit to the external environment, (see Abstract, "selective forwarding").

Chung et al teaches that the backup processes should not be able to respond to the external environment, but should be capable of receiving communications from the external environment through some means, (col. 1, lines 64-67). One of ordinary skill in the art at the time of applicant's invention would have clearly recognized that the buffer controller disclosed in Williams offers a means of forwarding communications from the external environment to all duplicate processes, while selectively enabling only a primary process to communicate to the external environment. It would have been obvious to one of ordinary skill in the art to include the buffer controller of Williams in the system disclosed in Chung et al, in order to ensure proper communication between the external environment and the duplicate processes.

Regarding claim 25, Chung et al fails to teach that the exception signal is a machine check abort signal.

Tu et al teaches, (col. 5, lines 9-12), that the exception signal generated upon detection of a memory error is a machine check abort signal.

At the time of applicant's invention, one of ordinary skill in the art would have considered it obvious to use a machine check abort signal upon detection of a memory failure condition. Tu et al teaches that a machine check abort exception should occur in a processor when an error condition arises that requires corrective action, (see col. 1, lines 36-38). Tu et al also teaches that a memory error condition qualifies as a condition requiring corrective action, (col. 5, lines 9-12). One of ordinary skill in the art at the time of applicant's invention, in view of Tu et al, would, therefore, have considered it obvious to use a machine check abort signal upon detection of a memory failure, and would have been motivated to do so in order to facilitate corrective action.

5. Claims 11, 26 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung, in view of Brittain, as applied to claim 1 above, and further in view of Williams.

Regarding claim 11, Chung, in view of Brittain, teaches synchronizing the processes, (see Chung, col. 2, lines 9-11), but fails to explicitly teach that the processes are synchronized upon transmission by one of the processes to an external environment.

Williams teaches a multi-process computer system which provides fault tolerance for a number of duplicate processing sets, in which the duplicate processes are synchronized upon transmission by one of the processes to an external environment, (see Abstract).

At the time of applicant's invention, it would have been obvious to one of ordinary skill in the art to include the means of synchronization taught by Williams for synchronizing the duplicate processes disclosed in Chung, in view of Brittain. By monitoring the outputs of the duplicate processes and synchronizing the processes upon receipt of the outputs, the system is able to synchronize the operation of processes that might otherwise operate asynchronously, (see col. 1, lines 39-43 in Williams). One of ordinary skill in the art would have considered it obvious and would have been properly motivated to combine synchronizing the processes upon transmission by one of the processes to an external environment, in the method disclosed by Chung, in view of Brittain, in order to enable the synchronization of processes that otherwise operate asynchronously.

Regarding claim 26, Chung, in view of Brittain, teaches synchronizing the processes, (see Chung, col. 2, lines 9-11), but fails to teach the processes communicating, through a synchronization buffer, with an external environment, wherein keeping the processes in synchronization is based on interaction between the processes and the external environment through the synchronization buffer.

Williams teaches a multi-process computer system comprising a method wherein the processes communicate, through a synchronization buffer, with an external environment, (see col. 1, lines 56-63), and wherein keeping the processes in synchronization is based on interaction between the processes and the external environment through the synchronization buffer, (note col. 5, lines 46-56).

At the time of applicant's invention, one of ordinary skill in the art would have considered it obvious to use the synchronization buffer of Williams as the means of keeping the duplicate processes in synchronization with the primary process of Chung, in view of Brittain.

One of ordinary skill in the art would have been motivated to combine the teachings because, Chung, in view of Brittain, teaches a "hot backup" style, (see Chung, col. 2, lines 7-14), wherein two or more copies of an application module are active at run time, and, wherein, the states are synchronized among the multiple copies. In order

for one copy to be able to immediately take over for another copy, it is important that they be held in strict synchronism, to avoid delay in the fail-over process. The synchronization buffer of Williams allows two simultaneously running processes to ensure that they are not running out of sync, and further enhances reliability in the system by comparing outputs from the two processes and forwarding the outputs only when they are determined to be equivalent, (see Williams, col. 1, lines 55-63, and col. 2, lines 43-48). Therefore, one of ordinary skill in the art would have been properly motivated to combine the synchronization buffer of Williams with the system disclosed in Chung, in view of Brittain, in order to achieve the need disclosed in Chung, in view of Brittain, of maintaining a synchronous relationship between application modules in a "hot backup" configuration, with an additional benefit of improving reliability in the processing done by said modules.

Claim 29 is rejected because it recites limitations similar to claim 26, except in the context of a computer-usable medium embodying computer program code for commanding a computer to perform memory failure recovery.

6. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung, in view of Brittain, as applied to claim 1 above, and further in view of Jewett et al, (U.S. 6,263,452 B1).

Regarding claims 9 and 10, Chung, in view of Brittain, teaches synchronizing the processes, (col. 2, lines 9-11), but fails to teach that the processes are synchronized upon receipt of data or receipt of signals from an external environment.

Jewett et al teaches a fault-tolerant computer system with redundant components that are synchronized upon detecting events such as memory references, (see col. 2, lines 46-49). A memory reference event entails the receipt of data and the receipt of a signal.

Chung, Brittain, and Jewett et al are analogous art because they are from the same field of endeavor, viz., fault-tolerant computer systems with redundantly operating components.

One of ordinary skill in the art at the time of applicant's invention would have considered it obvious to perform the step of synchronizing the duplicate processes upon receipt of a signal or data. One of ordinary skill in the art would have clearly recognized that synchronizing redundant processes upon receipt of data is a simple means of ensuring that all processes execute a given function simultaneously, (see Williams, col. 2, lines 46-49): Any time a signal or data is received by a process, there is potential for the state of the process to be altered. One of ordinary skill in the art would have been properly motivated to synchronize duplicate processes

upon the receipt of data or a signal, in order to coordinate the processes and ensure that any change of state occurs simultaneously between the processes.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chung, in view of Brittain, as applied to claims 1 and 4 above, and further in view of Hayden, (U.S. 2003/0061530 A1).

Regarding claim 6, Chung, in view of Brittain, fails to teach that the monitoring element includes dynamically modifying the fault-tolerance value of the primary process, in response to a computer command.

Hayden teaches a redundant component system in which a monitoring element dynamically modifies a fault-tolerance value, ("redundant component quantity"), of the primary process, in response to a computer command, (see paragraph 0008).

Chung, Brittain, and Hayden are analogous art because they are from the same field of endeavor, viz., redundant component systems with variable levels of redundancy for a given component.

One of ordinary skill in the art at the time of applicant's invention would have considered it obvious to include capability to dynamically modify a fault-tolerance

value of a primary process, as taught in Hayden, to the system disclosed by Chung, in view of Brittain. Should the needs of the system change during processing, the addition of dynamically modifying the fault-tolerance value of a primary process ensures that a minimum level of redundancy is provided for the process that will maintain fault-tolerant reliability, and conserve system resources, (see paragraphs 0008 and 0034). One of ordinary skill in the art would have been properly motivated to include the capability of dynamically modifying the fault-tolerance value of a primary process based on system data, as taught in Hayden, to the methods disclosed in Chung, in view of Brittain, in order to conserve system resources and maintain a proper level of redundancy at all times.

8. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung, in view of Brittain, as applied to claim 1 above, and further in view of official notice.

Regarding claims 13 and 14, it has already been shown that Chung, in view of Brittain, teaches that only one of the process is permitted to transmit to an external environment.

Chung, in view of Brittain, fails to teach that only one of the processes is permitted to perform a system call or a library call to an external environment.

Examiner takes official notice that many possible types of transmission between a process and an external environment, including system and library calls, would have been well known in the art at the time of applicant's invention.

At the time of applicant's invention, it would have been obvious to one of ordinary skill in the art to include system calls and library calls among the types of transmissions that only one of the processes would be permitted to send to an external environment. In order for a process to be able to communicate properly with an external environment, it may be necessary to perform a system call or a library call. As both types of transmission would have been well known in the art, one of ordinary skill in the art would have been properly motivated to include system calls and library calls among the types of transmissions only one process would be permitted to send, in the method disclosed in Chung, in view of Brittain, in order to enable proper and thorough communication between said process and the external environment.

9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chung, and further in view of official notice.

Chung et al teaches a method for failure recovery, comprising:

- Maintaining a predetermined number of duplicate and primary processes, (col. 1, lines 62-64);
- Keeping the processes in synchronization, (note col. 1, lines 62-67);
- Managing the processes so that a single process image is presented to an external environment, (see col. 1, lines 64-66; only the primary process is capable of presenting a process image to the external environment);
- Detecting a computer system exception which affects one of the processes, and terminating the affected process, (note col. 2, lines 39-41; a step of terminating a process is inherently included in a step of restarting a process).

Wherein the maintaining element includes:

- Identifying a primary process, (lines 7-9);
- Monitoring a fault-tolerance value corresponding to the primary process, (lines 10-11; also, see Figure 2); and
- Setting a number of duplicate processes equal to the fault-tolerance value, (lines 14-15).

Wherein the managing element includes:

- Permitting only one of the processes to transmit to an external environment, (note col. 1, lines 64-66).

Chung et al fails to teach that the managing element includes permitting only one of the processes to perform a system call to an external environment.

Examiner takes official notice that many possible types of transmission between a process and an external environment, including system calls, would have been well known in the art at the time of applicant's invention.

At the time of applicant's invention, it would have been obvious to one of ordinary skill in the art to include system calls among the types of transmissions that only one of the processes would be permitted to send to an external environment. In order for a process to be able to communicate properly with an external environment, it may be necessary to perform a system call. As this type of transmission would have been well known in the art, one of ordinary skill in the art would have been properly motivated to include system calls among the types of transmissions only one process would be permitted to send, in the method disclosed in Chung et al, in order to enable proper and thorough communication between said process and the external environment.

9. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al, in view of official notice, as applied to claim 15 above, and further in view of Williams.

Regarding claim 27, Chung et al, in view of official notice, fails to teach the method of claim 15, wherein keeping the processes in synchronization is based on data or signals received from the external environment. However, Chung does teach

communicating with an external environment, the external environment including computer functionality outside the processes, (see col. 1, lines 60-67).

Williams teaches a multi-process computer system comprising a method wherein keeping the processes in synchronization is based on data or signals received from the external environment, the external environment including computer functionality outside the processes, (see col. 5, lines 46-56).

At the time of applicant's invention, one of ordinary skill in the art would have considered it obvious to include the means of synchronization of multiple redundant processes taught in Williams, with the fault-tolerant method of Chung, in view of official notice.

One of ordinary skill in the art would have been motivated to combine the teachings because, Chung, in view of official notice, teaches a "hot backup" style, (see Chung, col. 2, lines 7-14), wherein two or more copies of an application module are active at run time, and, wherein, the states are synchronized among the multiple copies. In order for one copy to be able to immediately take over for another copy, it is important that they be held in strict synchronism, to avoid delay in the fail-over process. The means taught in Williams of synchronizing multiple processes based on data or signals received from an external environment, allows two simultaneously running processes to ensure that they are not running out of sync independent of the

processes' control. This is important, because a faulty process will not negatively effect an out-of-sync determination due to its faulty state. Therefore, one of ordinary skill in the art would have been properly motivated to combine the synchronization buffer of Williams with the system disclosed in Chung, in view of official notice, in order to achieve the need disclosed in Chung, in view of official notice, of maintaining a synchronous relationship between application modules in a "hot backup" configuration, free from possible negative influences of faulty processes.

10. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al, in view of official notice, as applied to claim 15 above, and further in view of Brittain et al.

Regarding claim 28, Chung, in view of official notice, fails to teach that the predetermined number of duplicate and primary processes are maintained in a computer.

Brittain teaches a method for maintaining a number of duplicate and primary processes to improve fault-tolerance in a computer system, (see Abstract). Though Brittain also teaches an embodiment wherein said duplicate processes run on separate computers, Brittain discloses an embodiment wherein all copies of a process reside on a single computer, (see Abstract, and col. 4, lines 61-64).

At the time of applicant's invention, one of ordinary skill in the art would have considered it obvious to combine those steps disclosed in Chung, in view of official notice, for providing a method for failure recovery in a distributed computer system, with the method of Brittain, in order to provide a method for failure recovery, with the advantages of Chung, in a single computer.

One of ordinary skill in the art would have been motivated to combine the teachings because Brittain shows a need in the art for providing fault-tolerance in single computer systems, by running redundant copies of software processes. Although Chung teaches a fault-tolerant method for use in distributed computer systems, in view of Brittain, one of ordinary skill in the art would have clearly recognized the direct applicability of such a method in a system comprising a single computer. Brittain shows that one can provide fault-tolerance in a single computer system by running redundant processes within the same CPU. One of ordinary skill in the art would have been properly motivated, in view of Brittain, to utilize the method taught in Chung as a means for providing fault-tolerance in systems without access to multiple computers for storing backup copies.

11. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al, in view of Williams and Tu et al, as applied to claim 23 above, and further in view of Brittain et al.

Regarding claim 30, Chung, in view of Williams and Tu, fails to teach the system of claim 23 wherein the primary process, duplicate process, synchronization buffer, processor, and operating system are part of a computer.

Brittain teaches a system for maintaining a number of duplicate and primary processes to improve fault-tolerance in a computer system, (see Abstract). Though Brittain also teaches an embodiment wherein said duplicate processes run on separate computers, Brittain discloses an embodiment wherein all copies of a process reside on a single computer, (see Abstract, and col. 4, lines 61-64).

At the time of applicant's invention, one of ordinary skill in the art would have considered it obvious to combine the system of Chung, in view of Williams and Tu, comprising the primary process, duplicate process, synchronization buffer, processor, and operation system, with the method of Brittain, in order to provide a method for failure recovery, with the advantages of Chung, in view of Williams and Tu, in a single computer.

One of ordinary skill in the art would have been motivated to combine the teachings because Brittain shows a need in the art for providing fault-tolerance in single computer systems, by running redundant copies of software processes. Although Chung teaches a fault-tolerant distributed computer, in view of Brittain, one of ordinary skill in the art would have clearly recognized the direct applicability of such

a method in a system comprising a single computer. Brittain shows that one can provide fault-tolerance in a single computer system by running redundant processes within the same CPU. One of ordinary skill in the art would have been properly motivated, in view of Brittain, to utilize the system of Chung, in view of Williams and Tu, comprising those elements disclosed in claim 23, as a means for providing fault-tolerance in systems without access to multiple computers for storing backup copies.

Response to Arguments

12. Applicant's arguments, see page 12, filed 12/20/2004, with respect to OBJECTIONS TO SPECIFICATION AND CLAIMS have been fully considered and are persuasive. The objections to the specification and claims have been withdrawn.

13. Applicant's arguments regarding REJECTION OF CLAIMS UNDER 35 U.S.C. 102 and 103, filed 12/20/2004 have been fully considered but they are not persuasive.

On pages 15-17, regarding claim 23, applicant argues that, "...there is absolutely no mention whatsoever that the watchdog daemon performs the termination of an application module...", and, "...attempting to restart an application module is not the same as terminating the application module. In face, restarting an application

module is the opposite of terminating the application module." Examiner respectfully disagrees.

As was shown, Chung teaches, (col. 2, lines 39-41 and 45-49), restarting a process in which a failure is detected. As it is known in the art, restarting a process comprises the steps of terminating its current state and then starting the process anew from its original configuration. Therefore, the step of restarting a process includes the step of terminating the process.

Applicant also argues, regarding claim 23, that, "Chung describes watchdog daemons for performing various tasks – there is no indication whatsoever that these watchdog daemons are part of the operating system." And, that, "the office action has failed to establish that the watchdog daemons are necessarily part of an operating system – therefore, the office action has failed to establish that Chung teaches an operating system to perform the tasks recited in claim 23." The examiner respectfully disagrees.

As was noted in the office action, Chung discloses a watchdog daemon process for receiving the exception signal, terminating the affected primary process, and maintaining a predetermined number of primary and duplicate processes, (see col. 3, lines 39-41; also note col. 3, lines 24-31). The examiner stated in the prior office action that it is inherent that there be an operating system present for performing

these functions. According to the Microsoft Computer Dictionary, a "daemon" is a "program associated with UNIX systems that performs a housekeeping or maintenance utility function without being called by the user." Therefore, since UNIX is an operating system well known in the art, Chung inherently discloses an operating system for performing those functions detailed above, when disclosing the daemon for performing said functions.

Applicant further argues, regarding claim 23, that, "there existed no motivation or suggestion to incorporate the buffers described in the multiprocessor computer system of Williams into the Chung networked environment." Applicant states that, "the buffering mechanism described in Williams enables interactions among the multiple processors of the multiprocessing system of Williams. However, there is no desirability to apply such a buffering mechanism to a networked environment having multiple host computer, as described in Chung." The examiner respectfully disagrees.

Chung teaches a "hot backup" style, (see col. 2, lines 7-14), wherein two or more copies of an application module are active at run time, and, wherein, the states are synchronized among the multiple copies. In order for one copy to be able to immediately take over for another copy, it is important that they be held in strict synchronism, to avoid delay in the fail-over process. The synchronization buffer of Williams allows two simultaneously running processes to ensure that they are not

running out of sync, and further enhances reliability in the system by comparing outputs from the two processes and forwarding the outputs only when they are determined to be equivalent, (see Williams, col. 1, lines 55-63, and col. 2, lines 43-48). Therefore, one of ordinary skill in the art would have been properly motivated to combine the synchronization buffer of Williams with the system disclosed in Chung, in order to achieve the need disclosed in Chung of maintaining a synchronous relationship between application modules in a "hot backup" configuration, with an additional benefit of improving reliability in the processing done by said modules.

On page 14, regarding examiner's rejection to claims 13-15 as being obvious over Chung in view of "official notice", applicant argues that "the element of claim 15 at issue, 'permitting only one of the processes to perform a system call to an external environment,' is not of such 'instant and unquestionable demonstration as being well-known.'" Applicant further states, "if a reference exists that teaches or suggests a modification of Chung to add the last element of claim 15, then Applicant respectfully requests production of such a reference." Applicant has made similar arguments regarding claims 13 and 14.

Recall that Chung teaches a method wherein the managing element includes: permitting only one of the processes to transmit to an external environment, (see col. 1, lines 64-66).

Swanberg, (US 6,725,366), teaches a computer system that uses external program calls to access external, shared data. These program calls are disclosed as comprising system calls, (see col. 3, lines 25-50; note, in particular, line 40).

At the time of applicant's invention, it would have been obvious to one of ordinary skill in the art, in view of Swanberg, to include system calls among the types of transmissions that only one of the processes would be permitted to send to an external environment. In order for a process to be able to communicate properly with an external environment, it may be necessary to perform a system call. As this type of transmission would have been well known in the art, one of ordinary skill in the art would have been properly motivated to include system calls among the types of transmissions only one process would be permitted to send, in the method disclosed in Chung et al, in order to enable proper and thorough communication between said process and the external environment.

Applicant's arguments with respect to claims 1, 17, and 22 have been considered but are moot in view of the new ground(s) of rejection. (See discussion above regarding claims 1, 17 and 22).

Applicant's arguments with respect to claims 3 and 19 have been considered but are moot in view of the new ground(s) of rejection. (See discussion above regarding claims 3 and 19).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron D Matthew whose telephone number is (571) 272-3662. The examiner can normally be reached on Mon-Fri, from 8:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert W Beausoliel can be reached on (571) 272-3645. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Aaron D Matthew
Examiner
Art Unit 2114

ADM

SCOTT BADERMAN
PRIMARY EXAMINER